



CDF at ANL/HEP



Barry Wicklund & Larry Nodulman remain active
Reading group, b physics & Cal co-leader, EWK co-convenor
Also authors: Tom LeCompte (honorary) Sacha Paramanov (Z/jet balance
NIM, timing out)
And Steve Kuhlman preshower calib and Bob Blair GP and talk!

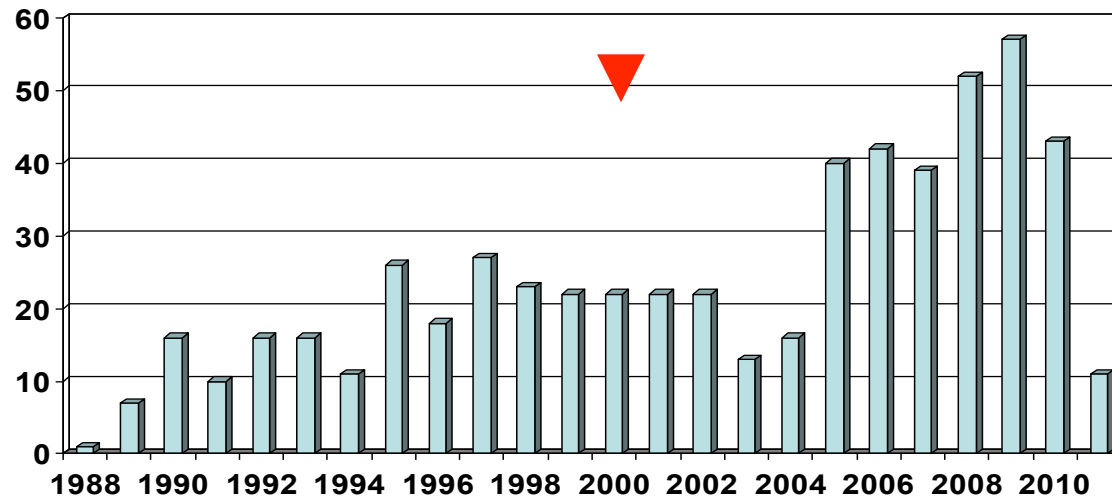
A bit of history:

Bob Diebold, Jim Simpson etc. participated in prehistory
We (ANL) led design & construction of central EM system, preshower,
shower max trigger, helped build upgrade drift chamber, led preshower
upgrade
Lots of involvement (& leadership) in operations and physics: B, QCD, EWK

CDF still active for physics: H search, particularly low mass, legacy/niche
measurements: top asym, mass, Z asym, W mass. Much “close out” work.
Operations & computing: doing well thanks!



CDF Publications through Jan 2011



CDF Publications Editorial Group (“SPRG”)

J. Appel, G. Bellettini, K. Burkett, T. Dorigo, P. Renton, J. Rosner, B. Wicklund (convener)

The CDF editorial committee has reviewed **51 paper drafts since Jan. 1, 2011**, i.e. one draft every 1.9 working days.

“Dear Barry, as you know from discussions we have had, we very much value the contribution the SPRG is making to CDF, and we envision its role to become increasingly important as we transition towards an analysis-only collaboration. We are happy to discuss further with you the details of how this can be played out, but one obvious thing is that you have been carrying out a large volume of work, and you could use some help.”

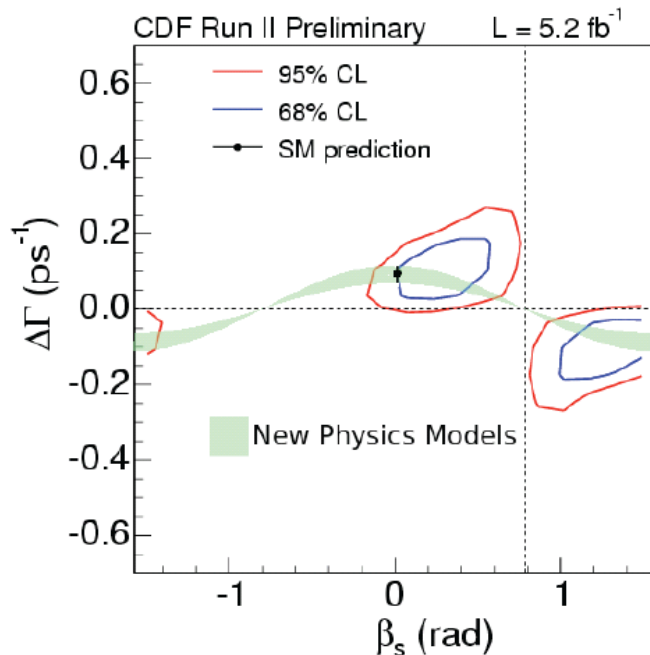
Larry Nodulman ANL/HEP 5/24/2011



Barry continues studying b physics



CPV in $B_s \rightarrow J/\psi s\text{-}\bar{s}$ States



Back to basics alternative approach- use angular distribution to measure physical observables that have Gaussian uncertainties. Phases in decay amplitudes and CPV phase β are **not** physical observables, but including $\Phi(1019)$ and $f_0(980)$ S wave,

Density matrix elements- $\text{Re/Im}(A_i * A_j) = \rho_{00}, \rho_{11}, \rho_{1-1}, \rho_{SS}, \rho_{0S}, \rho_{10S}$, and

CPV parameters- $\sin(2\beta), \cos(2\beta), \sin(2\beta)\Delta\Gamma$, and $\cos(2\beta)\Delta\Gamma$

Are Gaussian observables that can be extracted directly from angular distributions.

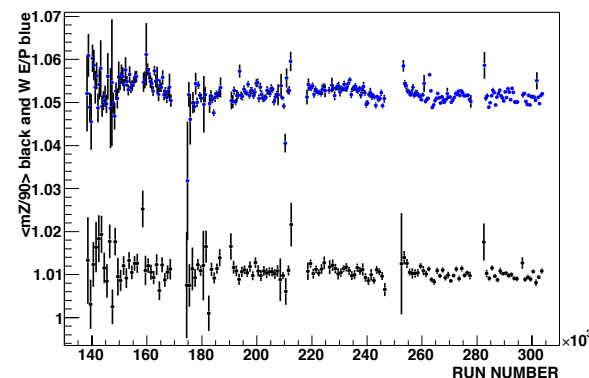


Larry Nodulman is co-leader of Calorimeter Ops (with Willis Sakumoto)



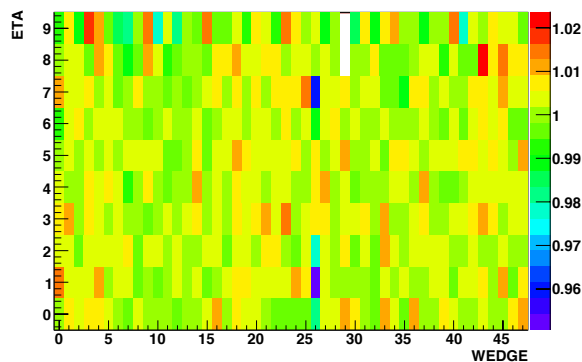
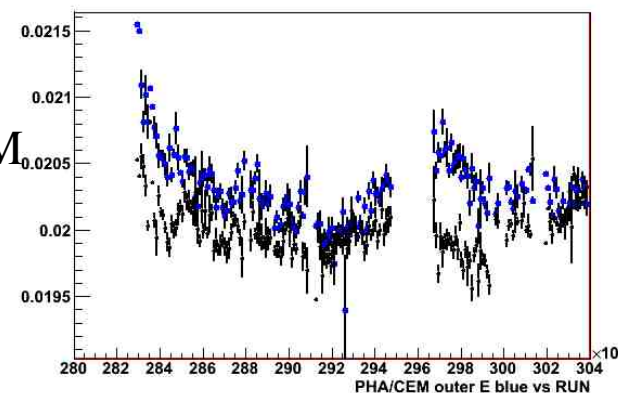
CEM fine, few channels slightly flaky
CHA/WHA survive ok (Happacher/Ptohos)
Plug OK to finish (Willis)
Central Shower Max(CES) survives (pew)
Electronics sometime TLC (CMU, WSU, FNAL)

Calibrations $\sim 400 \text{ pb}^{-1}$ cycle \rightarrow offline
Read production output for central e and minbias for jet calibration check
Side job check curvature corrections

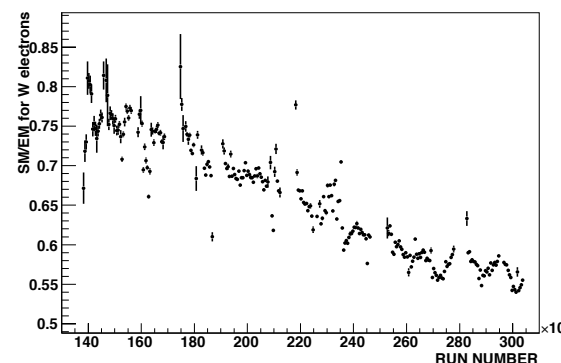


W(E/P)
mZ/90

MBS
PHA/CEM
counts



Current cycle
online CEM
relative tower
gains



CES/CEM
Ws



Electroweak Physics at CDF

L. Nodulman. M. Lancaster conveners for life?

Flagships:

mW:

(Duke, Oxford, UCL, TRIUMF, UC, ANL)

$0.2 \text{ pb}^{-1} \rightarrow 80414 \pm 48$

World w D0 $1 \text{ pb}^{-1} 80399 \pm 23$

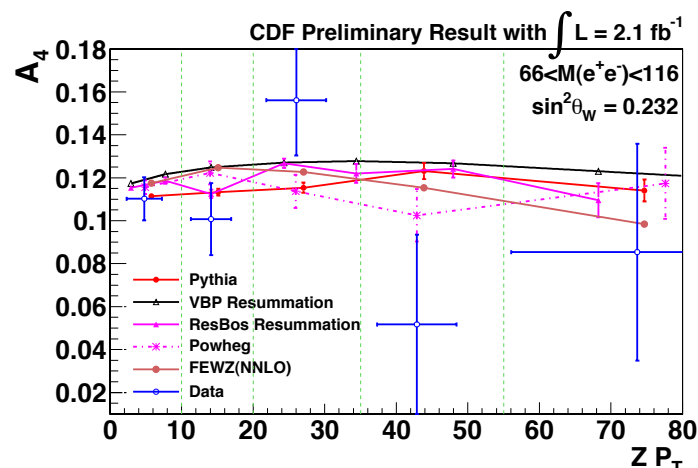
2.4 coming this fall $x \pm 25$

Z A4 $\sin^2 \Theta_W$:

(Rochester)

$= .2329 \pm .008(\text{A4}) \pm .009(\text{QCD})$

D0 similar –search common QCD



Larry Nodulman ANL/HEP 5/24/2011

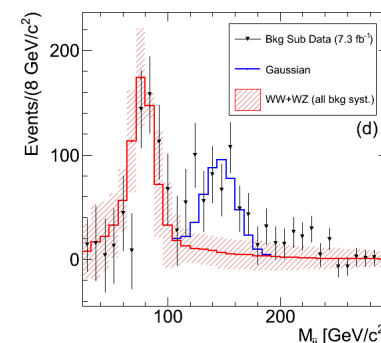
Other:

W $\rightarrow \pi \gamma$ (C. Lester) $< 6.4 \times 10^{-5}$ 95% CL

Z γ TGC Publish now!

W(jj) dibosons \rightarrow bump (ACC) soon 7.3 fb^{-1}

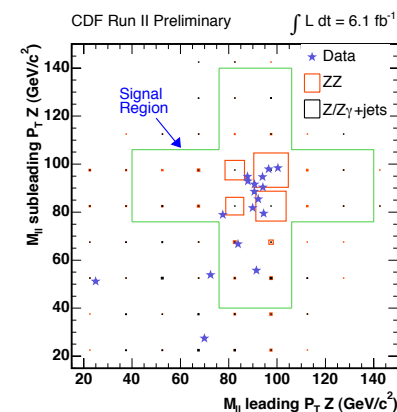
Coming soon



ZZ Penn exp 10 see 14 4l, Padova llvv σ .

FNAL/UCL search $< 0.2 \text{ pb}$

Soon m (4l)





Prospects



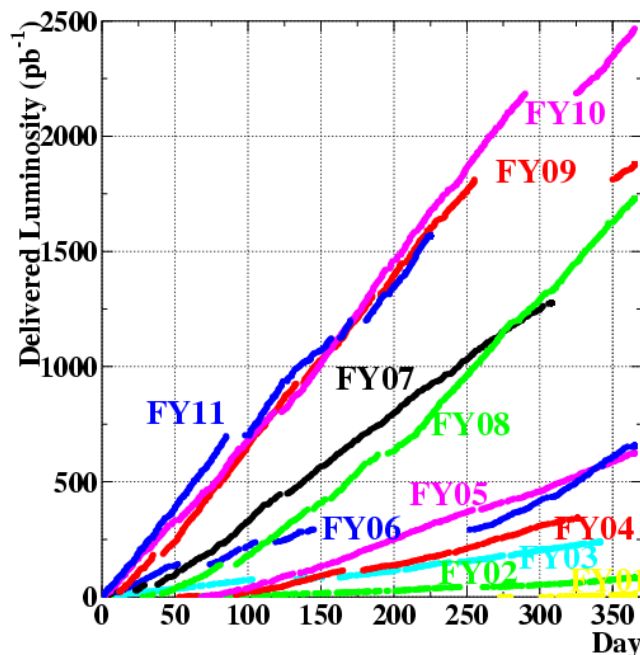
Reasonable expectation: 7.3fb^{-1} in hand, $12/10/9$
 fb^{-1} delivered/tape/good through end of FY11

We will do our part to let things end with style!

Some analyses (eg. light H) are positioned to make good use of more data, improving b tagging etc., others are lying fallow

Some areas have become mostly obsolete now that LHC has a decent sample (eg most searches, most b physics, TGCs - finish & publish now!), other results will be hard to beat ($m(\text{top})$, $m(W)$..

Physics analysis will continue at current intensity for a year after data taking ends, some things will take longer. It is important to retain institutional memory!





Backup: some things take time



Transverse Mass

CDF II Published 2007

$L = 200 \text{ pb}^{-1}$

m_T Uncertainty [MeV]	Electrons	Muons	Common
Lepton Scale	30	17	17
Lepton Resolution	9	3	0
Recoil Scale	9	9	9
Recoil Resolution	7	7	7
$u_{ }$ Efficiency	3	1	0
Lepton Removal	8	5	5
Backgrounds	8	9	0
$p_T(W)$	3	3	3
PDF	11	11	11
QED	11	12	11
Total Systematic	39	27	26
Statistical	48	54	0
Total	62	60	26

An order of magnitude more data (2 fb^{-1} sample) makes tracking, material, and other systematics much more difficult

TABLE II: Systematic uncertainties of the M_W measurement.

Source	ΔM_W (MeV)		
	m_T	p_T^e	E_T
Electron energy calibration	34	34	34
Electron resolution model	2	2	3
Electron shower modeling	4	6	7
Electron energy loss model	4	4	4
Hadronic recoil model	6	12	20
Electron efficiencies	5	6	5
Backgrounds	2	5	4
Experimental Subtotal	35	37	41
PDF	10	11	11
QED	7	7	9
Boson p_T	2	5	2
Production Subtotal	12	14	14
Total	37	40	43

D0 1 fb^{-1} (2009) dominated by scale from Z only and material in front of EM calorimeter. Statistics overall 21 MeV